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WITNESS my hand this
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TEAM LEADER EXAMINATION
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ORIGINAL

AUSTRALIA

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PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:

A Beam

Name and Address of Applicant:

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South Wales, 2475, Australia**

Name of Inventor:

Grant Charlwood

This invention is best described in the following statement:

A BEAM

Technical Field

5 The present invention relates to a roll formed beam and a method of roll forming a beam.

 The invention has been primarily developed in order to produce a relatively light weight beam of substantially rectangular cross-section for use in housing and construction, most particularly home extensions, and will be described with hereinafter
10 with reference to this application. However, it should be appreciated that the invention is not limited to this particular field of use.

Background of the Invention

15 One form of known, light weight construction beam, as used in home extensions, is produced by joining two roll formed channels of C-shaped cross section to form a beam of rectangular cross-section.

 One disadvantage associated with this known beam is that the two channels can slip relative to each other, which can lead to the beam: warping; losing strength; and/or a
20 making creaking noises. In extreme conditions, the two channels can kink and/or separate from one another, which generally results in the beam failing. Another disadvantage of this known beam is production is at least a two stage, two man operation involving: roll forming the two C-shaped channels; positioning the two channels in a press; and then
25 performing a pressing operation to join the channels together.

Object of the Invention

 It is an object of the present invention to substantially overcome or at least
30 ameliorate one or more of the above prior art disadvantages.

Summary of the Invention

Accordingly, in a first aspect, the present invention provides a roll formed beam of substantially rectangular cross-section formed from a unitary piece of metal, the beam including:

5 opposed first and second substantially parallel walls formed with at least three adjacent layers of said piece of metal; and

 opposed third and fourth substantially parallel walls between the first and second walls, one of the third or fourth walls having a seam joining two opposed longitudinal edges of the piece of metal.

10 Preferably, the opposed first and second walls are formed with three adjacent layers of said piece of metal.

 The beam preferably also includes at least two, most preferably three, adjacent layers of said piece of metal in the region of its four corners and directed away from the first and second walls.

15 The beam preferably also includes a plurality of outwardly concave indentations in the third and fourth walls. In a preferred form the beam includes three equi-spaced indentations in each of the third and fourth walls, wherein one of the indentations is formed by the seam.

20 The three layers in the first and second walls are preferably formed from two layers of metal spanning approximately half the width of the first and second walls and one layer spanning all of the width of the first and second walls.

 The first and second walls are preferably smaller than the third and fourth walls.

In a second aspect, the present invention provides a method of roll forming a beam of substantially rectangular cross-section from a unitary substantially flat piece of metal, the method comprising the following sequential steps:

25 forming a pair of spaced apart flattened sections of at least three layers of said metal in said metal piece;

 folding the outer edges of the metal piece at approximately right angles to the flattened sections near the outermost end of the flattened sections;

30 folding the folded outer edges of the metal piece at approximately right angles to the flattened sections near the innermost end of the flattened sections; and

 folding a joining seam between the adjacent outermost longitudinal edges of the metal piece.

The flattened sections are preferably formed by forming a pair of spaced apart channels in the metal piece, the channels each having a base and two sides; and flattening the channel bases against the remainder of the metal piece with the sides therebetween.

Preferably, the channel bases are flattened against the metal piece by drawing
5 together the edges of the sides of each channel remote the bases.

The outer edges of the metal piece are preferably folded at approximately right angles to the flattened channel bases approximately 15% along the length of the the flattened channel bases. The folded outer edges of the metal piece are preferably folded at approximately right angles to the flattened channel bases approximately 15% along the
10 length of the the flattened channel bases.

The method preferably also includes forming a plurality, most preferably five, indentations into the metal piece before the folding the outer edges of the metal piece relative to the flattened channel bases. In a preferred form, three indentations are folded between the flattened channel bases and one indentation is folded into the metal piece
15 outwardly of each flattened channel base.

Brief Description of the Drawings

A preferred embodiment of the invention will now be described, by way of example
20 only, in relation to the accompanying drawings in which:

Fig. 1 is a cross-sectional end view of an embodiment of a beam according to the invention;

Figs 2 to 37 are cross-sectional end views of the beam shown in Fig. 1 during sequential roll forming stages;

25 Fig. 38 is a roll forming flower diagram corresponding to the stages shown in Figures 2 to 21; and

Fig. 39 is a roll forming flower diagram corresponding to the stages shown in Figs. 22 to 37.

30 Detailed Description of the Preferred Embodiment

Referring firstly to Fig. 1, there is shown an embodiment of a roll formed beam 40 of substantially rectangular cross-section formed from a unitary piece of metal 42, in accordance with the invention.

The beam 40 has first and second parallel walls 44 and 46 formed from three adjacent layers 44a, 44b and 44c and 46a, 46b and 46c respectively of said metal piece 42. The beam 40 is generally installed such that, in use, the walls 44 and 46 represent the top and bottom walls of the beam 40 respectively. The beam 40 also has opposed third and fourth substantial parallel walls 48 and 50 which, in use, represent the side walls of the beam 40. The wall 48 includes a folded seam 52 which joins outermost longitudinal edges 42a and 42b of the metal piece 42, as will be described in more detail below.

The side wall 48 of the beam 40 has three outwardly concave indentations 54a, 54b and 54c formed therein. The indentation 54b is a by-product of the seam 52. The side wall 50 has three similar indentations 56a, 56b and 56c.

The triple layer top and bottom walls 44 and 46 are formed from an inner layer 44c that spans between the two side walls 48 and 50 and two half layers 44a and 44b that each span approximately half the distance between the two side walls 48 and 50. The triple layer construction of the top and bottom walls 44 and 46 adds strength to the beam 40. The triple layer construction also extends around the corners of the beam 40 from the top and bottom walls 44 and 46 in the direction of the side walls 48 and 50. This reinforces each of the side walls 48 and 50 in the regions 58, which are each of approximately 15 percent of the overall length of the side walls 48 and 50.

The beam 40 has a height of 110mm (ie. the walls 48 and 50), a width of 60mm (ie. the walls 44 and 46) and is produced from 0.55mm thickness COLORBOND (trade mark) material, as produced by BHP Steel Limited. Two other preferred sizes of beam are 160x60x0.75mm and 210x60x1.00mm.

The beam 40 is formed by the process of roll forming on a roll forming machine (not shown). The set-up and operation of a roll forming machine are well understood by persons skilled in that field and will not be described herein in any further detail.

Figs. 2 to 37 show the sequential roll forming stages the piece of metal 42 undergoes in order to form the beam 40. Fig. 38 shows a roll forming flower diagram that is equivalent to the roll forming stages shown in Figs. 2 to 21. Fig. 39 shows another roll forming flower diagram that is equivalent to the roll forming stages shown in Figs. 22 to 37. Whilst the roll forming diagrams and flower diagrams can themselves be considered self-explanatory, a general description of the roll forming operation is as follows.

Firstly, the flat piece of metal 42 is roll formed into the shape shown in Fig. 11 in which it has a pair of spaced apart channels 60 each having a base 60a and two sides 60b. The channel bases 60a are then flattened against the remainder of the metal piece 42 with the sides therebetween by folding the sides 60b under the bases 60a (see Fig. 20), to form

triple layered flattened sections 62. Outer edges 64 of the metal piece 42 are then folded at approximately right angles to the flattened sections 62, near the outer edges of the flattened sections 62, into the shape shown in Fig. 30. The folded outer edges 64 of the metal piece 42 are then folded, near the inner edges of the flattened channel sections 62, to form the substantially rectangular configuration shown in Fig. 36. The two longitudinal edges 42a and 42b of the metal piece 42 are then folded into the seam 52 (as best shown in Fig. 1) to form the rectangular beam 40 shown in Fig. 37.

The embodiment of the beam described above possesses many advantages over the known two part beams. Firstly, although they are slightly heavier, the beam is able to span 50 to 100% longer distances than a correspondingly sized two piece beam. Secondly, the beam has improved torsional rigidity compared to the known two part beams of a corresponding size. Thirdly, the beam can be produced by a single man, single roll forming operation which results in lower labour costs, lower plant costs and reduced manual handling. Fourthly, the beam can be produced from a variety of materials, including pre coated metal products which require no further surface finishing. Finally, the beam is aesthetically pleasing with the indentations serving to both replicate the appearance of a steel or timber beam and to camouflage the seam.

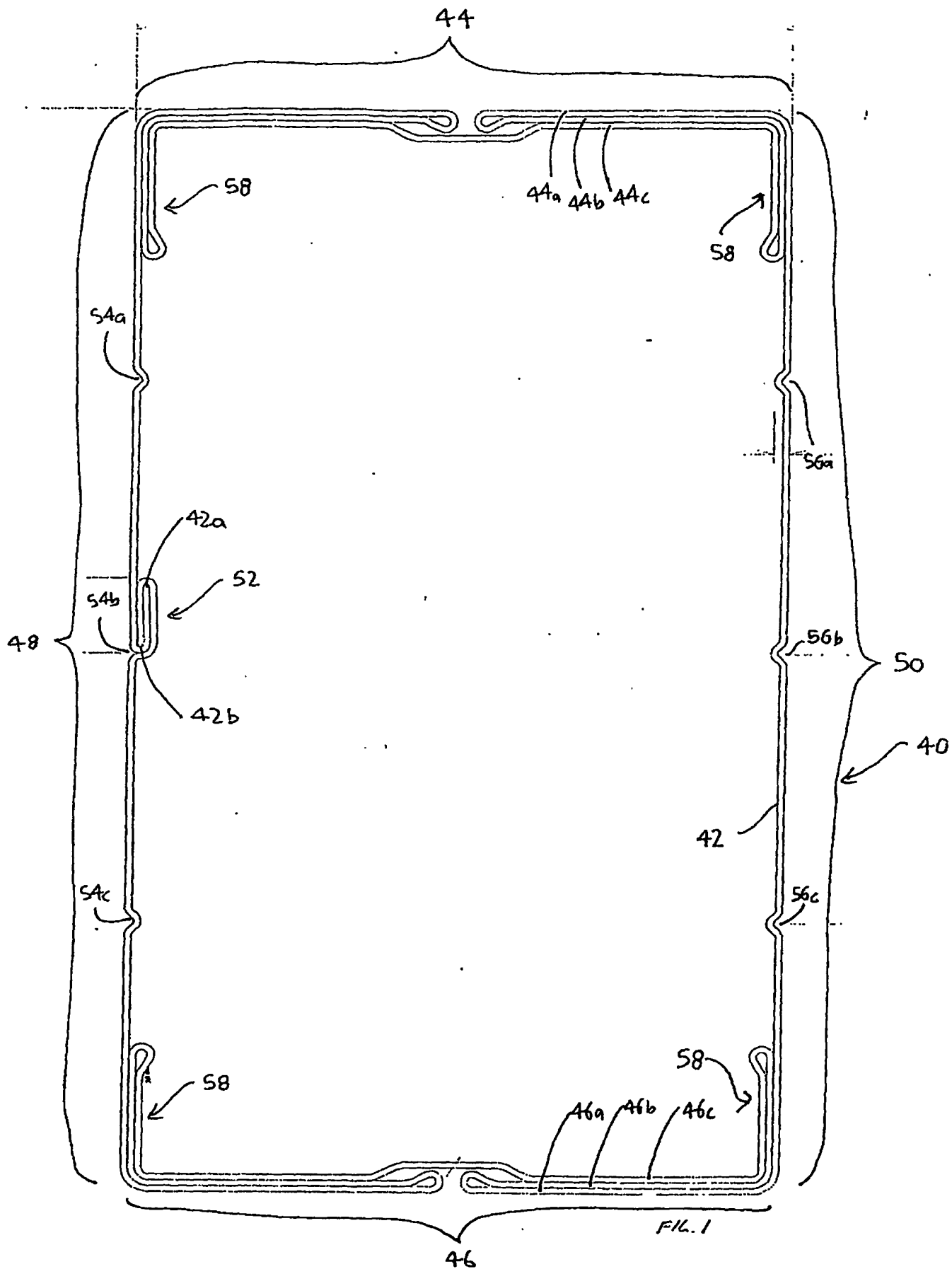
Although the invention has been described with reference to a specific example, it would be appreciated by those skilled in the art that the invention may be embodied in many other forms.

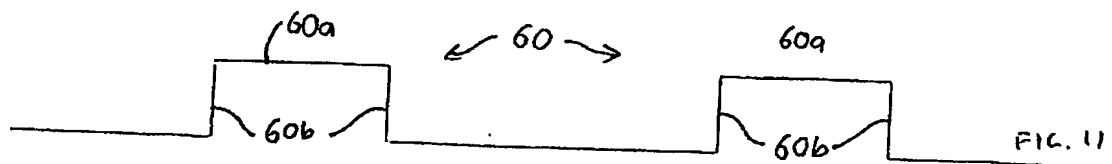
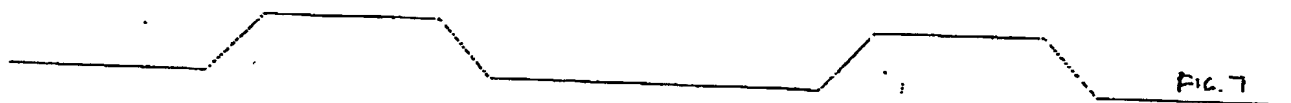
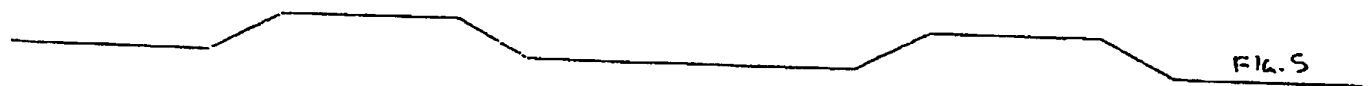
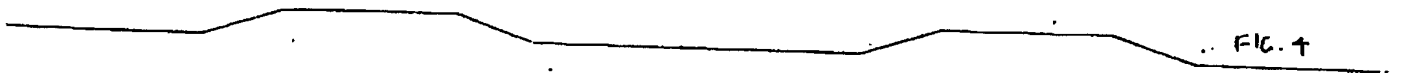
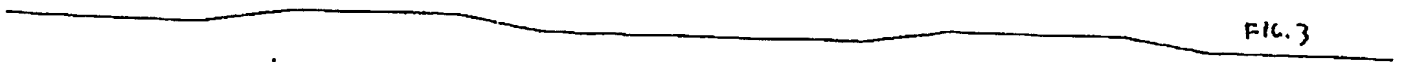
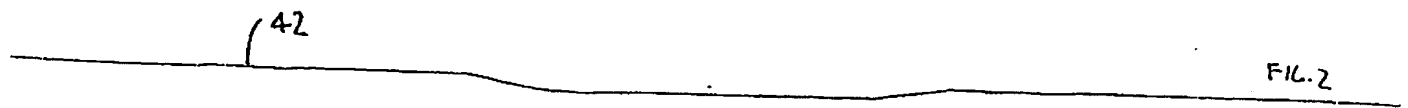
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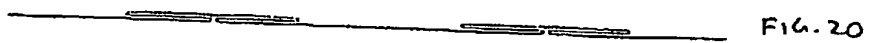
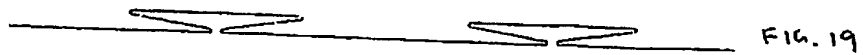
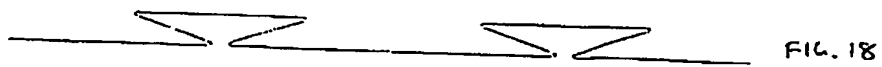
Grant Charlwood

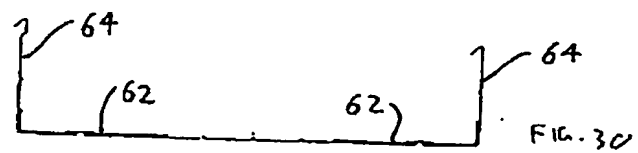
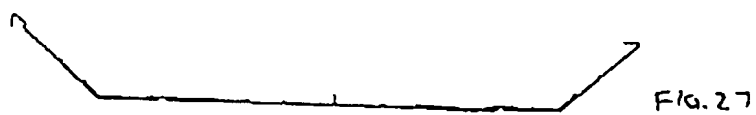
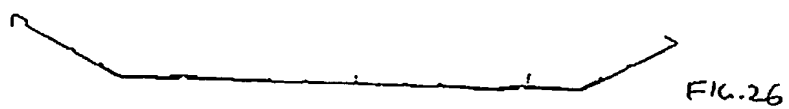
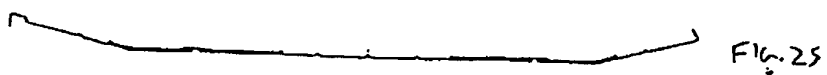
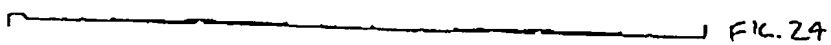
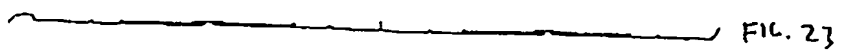
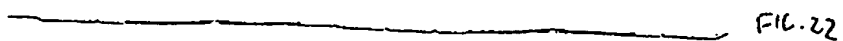
Patent Attorneys for the Applicant

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FIG. 32

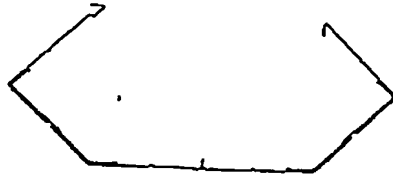


FIG. 33

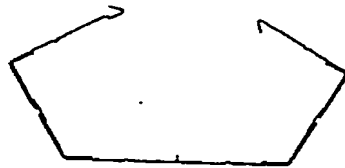


FIG. 34

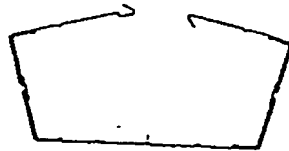


FIG. 35

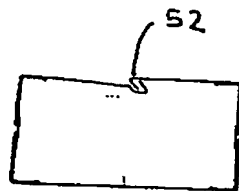


FIG. 36

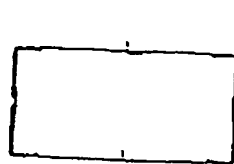


FIG. 37

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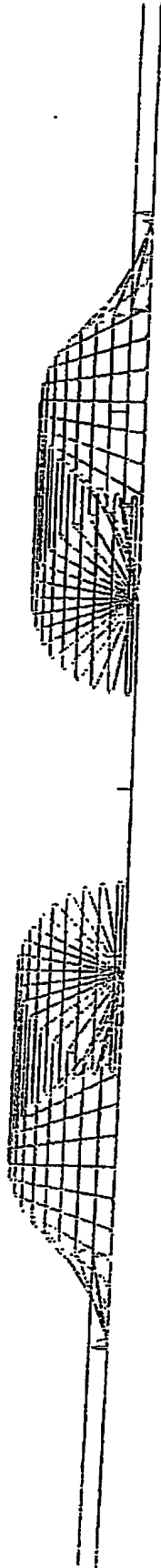


FIG. 38

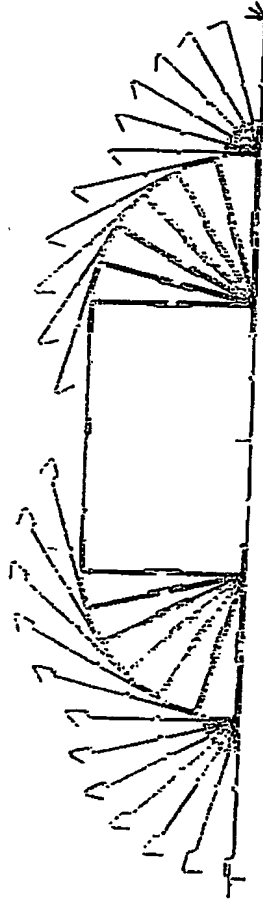


FIG. 39

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